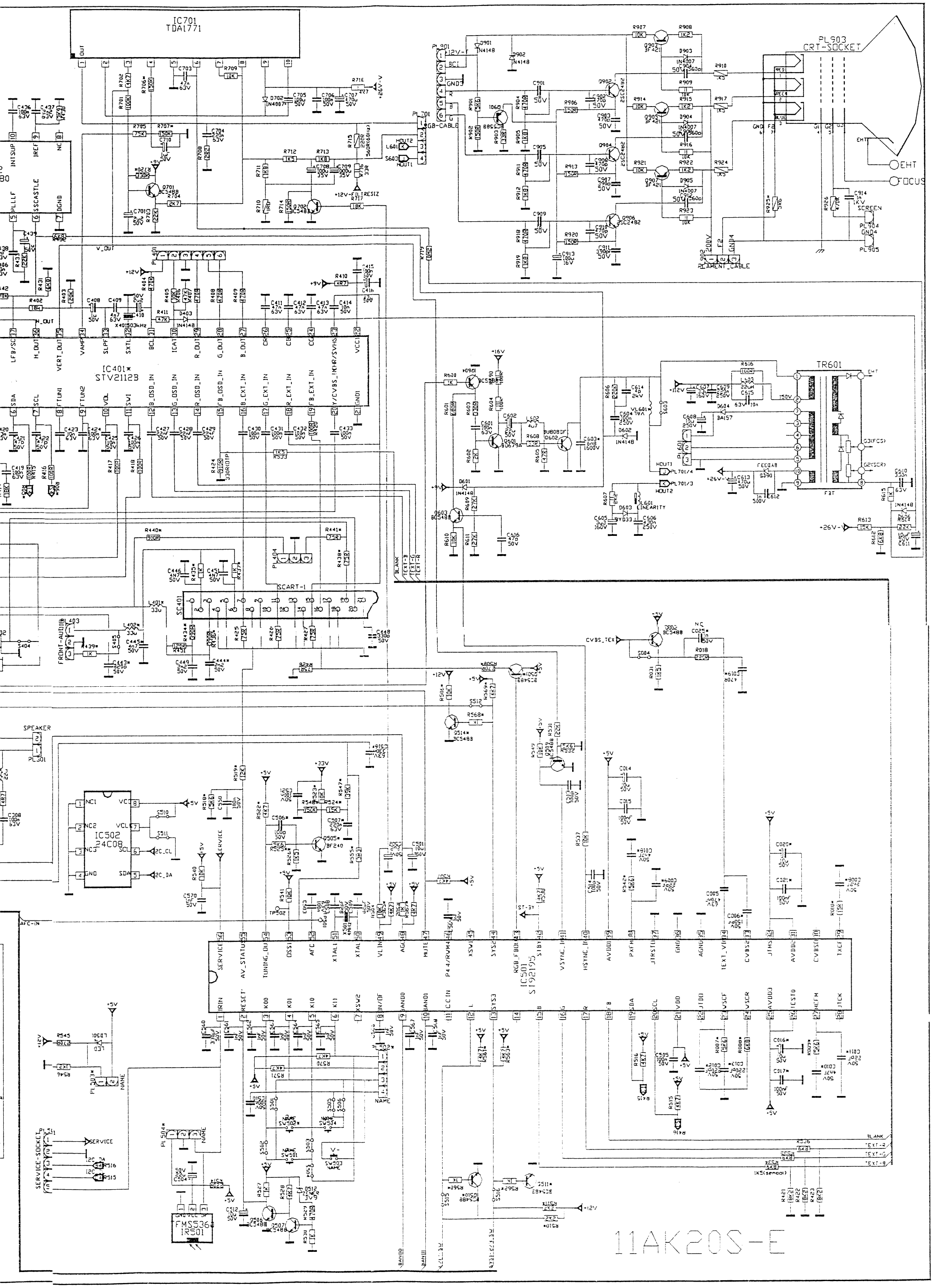
SCHALTBILD

WATSON

CHASSIS
11AK20SE/SE1

MC-Service


IC701
TDA1771
PL903
CRT-SOCKET
PL902
FILAMENT_CABLE
PL701
RGB-CABLE
TR601
IC401*
STV2112B
IC502
24C08
SCART-1
SC401
PL501
SPEAKER
SERVICE-SOCKET
IR501
FMSS36
11AK20S-E

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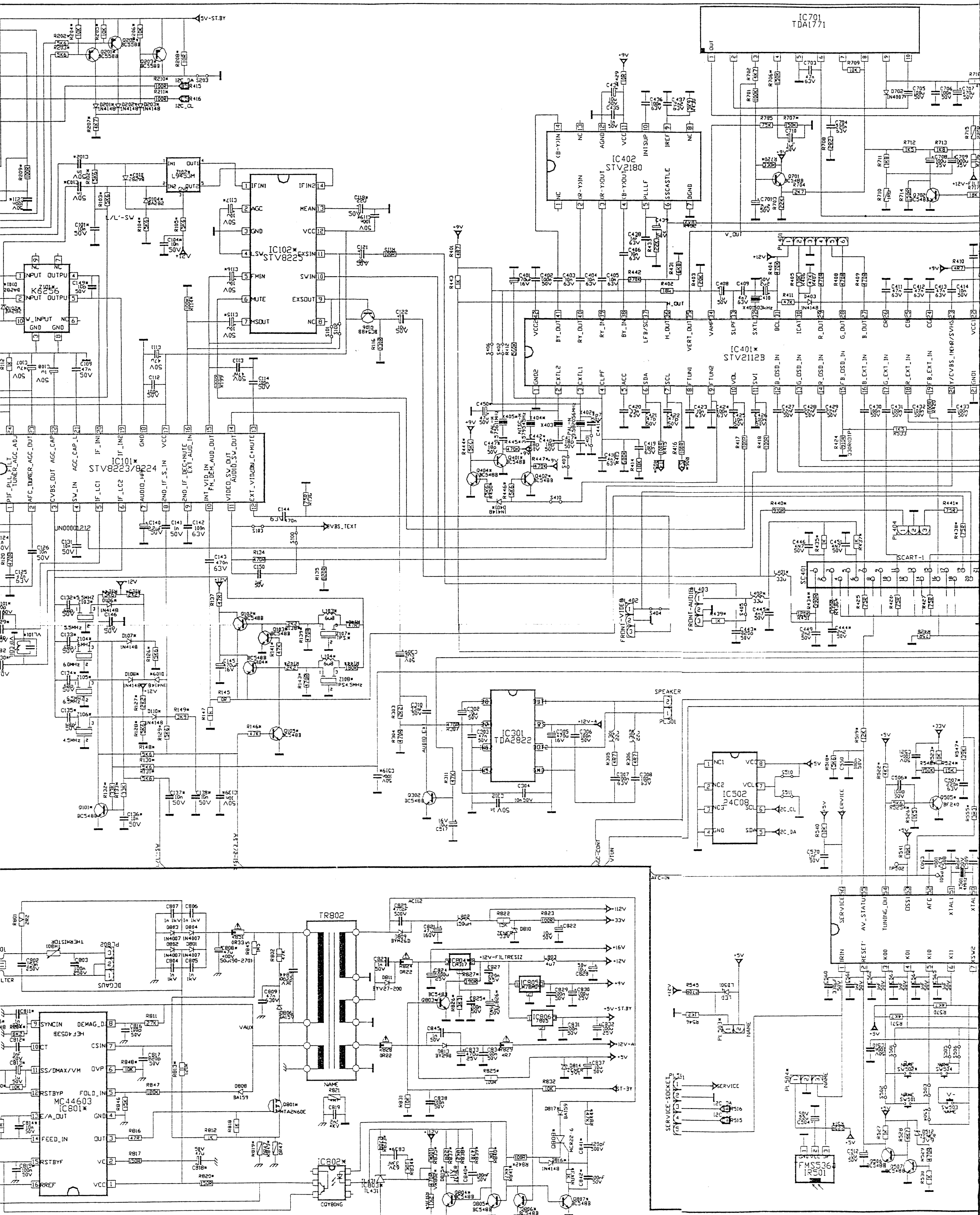
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TDA1771
IC402
STV2180
IC401
STV2112B
IC102
STV8225
IC101
STV8223/8224
IC301
TDA2822
IC502
24C08
MC44603
IC801
TR802
SCART-1
SPEAKER
FRONT-VIDEO
FRONT-AUDIO
SERVICE-SOCKET
5V-ST.BY
+9V
+12V
+33V
VBS_TEXT
V_OUT
H_OUT
AFC-IN
VTUN
CC-CONT

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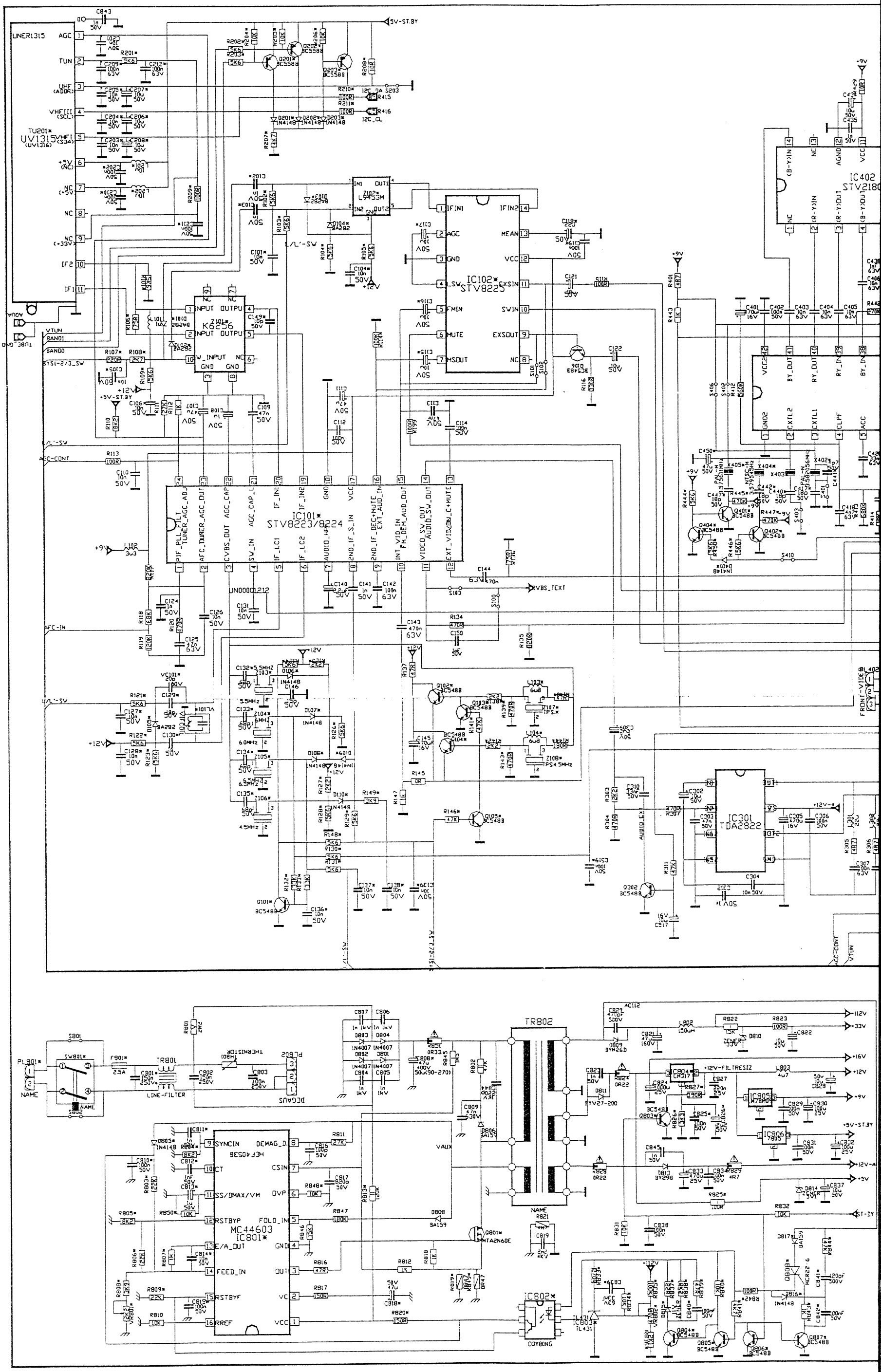
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AGC
TUN
VHF (ADDR)
VHF III (SCL)
TU201
UV1315
VHF (SDA)
+5V (NC)
NC (+5V)
NC (+33V)
IF2
IF1
5V-ST.BY
IC101
STV8223/8224
IC102
STV8225
IC301
TDA2822
IC402
STV2180
IC801
MC44603
IC802
IC803
TR802
TR801
VTUN
AFC-IN
AGC-CONT
L/L'-SW
EVBS_TEXT
FRONT-VIDEO
LINE-FILTER
NAME

MC-Service

SERVICE MANUEL

TELEVISION COLOUR

CHASSIS 11AK20

FOR ALL MODELS

11AK20 CHASSIS CIRCUIT DESCRIPTION

1. *GENERAL INFORMATION :*

This document provides detailed information about the fully I²C controlled Television Chassis named 11AK20.

11AK20 is based on the bus controlled circuits in which all the filters, traps and delay lines have been integrated. Therefore the numbers of external components are reduced and the user, service and factory adjustments are made through I²C BUS control.

This chassis has been designed mainly for the 90°, 14" and 15" picture tubes.

This chassis has a SMPS circuitry which has been designed to get low stand-by power consumption (less than 3W) as an option. On the other hand, it also has wide range (90-270V 50/60 Hz) mains as an option.

The chassis covers almost all the existing worldwide transmission and colour standards as PAL B/G/I/M/N, SECAM B/G/D/K/K'/L/L' and NTSC M (3.58), NTSC (4.43) using same Main Printed Circuit Board by means of optional components and settings. Tuning system is Voltage Synthesized for all systems Except NTSC M and PAL M/N applications but it is Frequency Synthesized for NTSC M and PAL M/N applications.

Furthermore, chassis has also European Wide-range teletext solution as an option. This solution supports all the European teletext standards optionally as 1 page normal, fast and top text modes.

The chassis has Euro AV Plug (Scart Socket) for Peritel and SVHS connections. The pictures in 16 - 9 format can be displayed via this Peritel connection. Other optional external connections are front AV input RCA jacks, back AV output RCA jacks and Headphone jack.

The software has been developed with a menu driven user interface supporting all possible chassis versions with a storage capacity of 100 programs.

2. *IF STAGE :*

The inputs for IF stage are IF inputs from Tuner to produce front-end Video and Audio, Video and Audio from Scart or front AV RCA jack to be able to select the internal or external video and audio according to the control signals which comes from microcontroller and STV 2118. Then, the resultant video and audio signals are sent to video processing stage and audio output stage, respectively. Furthermore, front-end video and audio signals are sent to scart and or back AV RCA jacks. This part also produces some control signals for tuner and microcontroller.

This stage was designed for processing positive (optional) and negative modulated mono and one scart applications.

STV 8223 is the IF IC that is used in only negative modulation. There is an alignment which is the VCO adjustment (VL101). The procedure of alignment can be described briefly as follows :

- The IF signal is applied to the IF inputs in accordance with the standards (for B/G 38.9MHz) at pin # 1 and 2 of SAW filter (Z101).
- Adjust the VL101 until getting 2.5 V_{dc} at pin # 9 of uC (IC501).

This stage is also used for negative and positive modulated, mono applications. STV 8224 (negative and positive modulation and FM sound) (IC 101) and STV 8225 (AM sound) (IC102) are the IF IC's.

There are two alignments in this case, which are the VCO adjustment (VL101) for B/G - L standards and VC101 for L' standard. The procedure of the alignments can be described briefly as follows :

The system is Switched to B/G standard reception,

- The IF signal is applied to the IF inputs in accordance with the standards (for B/G 38.9MHz) at pin # 1 and 2 of SAW Filter Z101.
- Adjust the VL101 until getting 2.5 V_{dc} at pin # 9 of uC.
- The system is Switched to L' standard reception,
- The IF signal is applied to the IF inputs in accordance with the standards (for L' 33.9MHz) at pin # 1 and 2 of SAW Filter Z101.
- Adjust the VC101 until getting 2.5 V_{dc} at pin # 9 of uC.

2.1 Video and Sound IF System & Switch IC STV8223:

STV 8223 is a picture and sound IF processor for negative application. The architecture of the video and sound demodulator, which are both based on PLL structure, allows a very good linearity of the Intermediate Frequency Response and an application with very few external components and adjustments.

The volume on the audio signal is controlled through a DC level (pin # 13) which is provided from STV 2112/2116/2118 where all the I²C decoding is realized.

STV 8223 also provides the audio and video switches for scart - AV applications.

The IF inputs at pins # 19 and # 20 are driven by Tuner via Saw filter (Z101). The baseband signal produced from these IF inputs appears at pin # 3. This signal is used to produce sound trapped video signal and intercarrier sound signal. For multi-standard models, a switched trap circuitry is used (Q103, Q104, Q105). This internal video signal is fed to pin # 10 of this IC for internal-external (coming from scart) video switching and to the base of the buffer transistor Q102 for the video output of the scart connector. The intercarrier signal used for reproducing sound, passes through the band pass filter Z103 with center frequency 5.5MHz for B/G standard or Z104 for I (6.0MHz) or Z105 for D/K (6.5MHz) or Z106 for M/N (4.5MHz) in according to selected system by intercarrier signal switching circuitry (D106, D107, D108, D109, D110) and resultant signal is applied to the pin #8 of the IC which is the input of limiter and SIF PLL stage.

MC-Service

3.1 Bus-controlled Multi-Standard TV Processor IC, STV 2118 :

The STV 2118 (IC 401) is a fully bus controlled IC for TV Luma, Chroma and Deflection processing. In order to make the alignments by microcontroller via I²C, the required data are transferred from microcontroller into the related registers of STV 2118. The main input for this IC are as follws :

- I²C Inputs from microcontrolle
- Y/CVBS Input from IF Part, external CVBS coming from scart or front AV RCA jack, external RGB and Fast Blank signals coming from Scart, R input is also used for Chroma input in SVHS Mode
- OSD and TELETEXT RGB and Fast Blank signals coming form both microcontroller and teletext processor IC
- BCI (Black Current Information) coming from CRT Baseboard
- BCL (Beam Current Limiting) information from Horizontal Output Stage
- Line Flyback Sample coming from Horizontal Output Stage
- Delayed R-Y and B-Y signals coming from Delay Line IC STV 2180

Detailed Features and the internal block diagram of the IC STV 2118 are given in following subsections:

3.1.1 Deflection Circuit :

The deflection part includes a fully integrated sync-separator locked to a 500 kHz VCO with external resonator (X401), two phase locked loops for horizontal deflection, vertical count down with 50 Hz and 60 Hz operation for field frequency.

Vertical output pulse is 10.5 lines long at pin # 35, furthermore horizontal output pulse is 28 msec on open collector pin # 36.

The horizontal output is at high level when Vcc increases from 0V to 6.8V. On shutting down, the horizontal pulse disabled when Vcc is below 6.2V.

When vertical pulses are disappeared, horizontal output is disabled by microcontroller for keeping CRT phosphor.

Line position adjustment is controlled by bus using related service mode.

Bus controlled output voltage at pin # 34 is used to adjust vertical amplitude at vertical output stage via R705, R706 and R707.

Bus controlled vertical position information is produced from high level of the vertical pulse pin # 35 and this signal is used to adjust vertical positioning at vertical output stage via R701, R703, R704, C701, D701 and Q701 .

The sandcastle signal at pin # 37 is used to control the external baseband chroma delay line (STV 2180 -IC 402- pin # 6).

3.1.2 Filters :

All filters (integrated trap filter, integrated chroma bandpass, integrated bell filter for SECAM, integrated delay line) are tuned with a reference PLL.

The PLL consists of a lowpass filter, a phase comparator, a loop filter (an external capacitor C423 on pin # 8). The reference signal is the continuous carrier wave from the VCO (4.43 MHz or 3.58 MHz). The PLL will adjust the center frequency of the lowpass so that it will be equal to the reference signal. The tuning voltage of the PLL (memorized on pin # 8) will adjust all other filters.

The cloche filter is fine-tuned with a second PLL operating during frame retrace. Tuning voltage is memorized on an external capacitor C424 at pin # 9.

3.1.3 Video Circuit :

Video part includes two RGB inputs, automatic cut-off control, DC cut-off adjustment, RGB gain adjustments, beam current limiting. Furthermore, user video settings (contrast, saturation, brightness and sharpness controls) are performed by this block. RGB output pins are as follows: R output is pin # 29, G output is pin # 28 and B output is pin # 27.

The beam current information is fed to pin # 31 via R411 and D403. This control voltage will act on contrast first, then the brightness will be decreased when contrast attenuation reaches -5dB.

Automatic cut-off function is realized according to the BCI information at pin # 30. Sequential cut-off current measurements are made during three lines after frame blanking signal.

3.1.4 Chroma Circuit :

The chroma part includes PAL, SECAM, NTSC demodulator. An external base band delay line (STV 2180 IC402) is used in this concept. R-Y and B-Y outputs of STV 2118 (pin # 40 and pin # 41) are sent to STV 2180 to get 64 msec delayed signals.

The PAL, SECAM or NTSC standard selection is made by automatic standard identification.

Three X'tals for PAL M (X404), PAL N (X405) and NTSC M (X403) and their switching circuitry (Q401, Q402, Q403, Q404, D401, D402) are used in PAL M/N and NTSC M models only.

SVHS selection is made by microcontroller via bus control.

The switch control signal is supplied by microcontroller. The limiter and SIF PLL output pin # 15 which is connected to the deemphasis capacitor drives audio out of the scart connector and AV jack. The external inputs of IC, which are pin # 12 for video and pin # 16 for audio, are connected to the related scart connector inputs or AV RCA jack inputs. The internal-external signal selection for monitoring is made by control voltage at pin # 8 produced by STV 2118. The selected video at pin # 11 drives video processing stage. On the other hand, the selected audio is processed in volume control stage in according with DC control voltage at pin # 13 and then, it is sent from pin # 14 to sound output stage.

The IF block produces control signals, which are AGC for tuner at pin # 23 in according to voltage of pin # 24 controlled by microcontroller pin # 2.

2.2 Multi-Standard Video and Sound IF System & Switch IC STV 8224 and AM SIF IC STV 8225 :

STV 8224 is a picture and sound IF processor for negative and positive applications. The architecture of the video and sound demodulator, which are both based on PLL structure, allows a very good linearity of the Intermediate Frequency Response and an application with very few external components and adjustments.

The volume on the audio signal is controlled through a DC level (pin #13) which is provided from STV 2112/2116/2118 where all the I^2C decoding is realized.
STV 8224 also provides the audio and video switches with STV 8225 for one scart applications.

The IF inputs at pins # 19 and # 20 are driven by Tuner via SAW filter (Z101) which is K6256 for B/G - L/L' applications. This saw filter is switchable according to the control signals produced by microcontroller.
The baseband signal at pin # 3 is produced from these IF inputs according to the control signal at pin # 4.
This control signal comes from STV 2118 Multi-Switch Output according to the selected system standard.

The baseband signal is used to produce sound trapped video signal and on the other hand to produce intercarrier sound signal for B/G standard. This internal video signal is fed to pin # 10 of this IC for internal-external (coming from scart) video switching and to the base of the buffer transistor Q102 for the video output of the scart connector. For the internal and external video switching, external video enters from pin #12, and then, selected video is sent from pin # 11 to video processing part.

The intercarrier signal used for reproducing sound, passes through the band pass filter Z103 with center frequency 5.5MHz for B/G standard and resultant signal is applied to the pin # 8 of the IC STV 8224 which is the input of limiter and SIF PLL stage. The limiter and SIF PLL output pin # 15 which is connected to the deemphasis capacitor drives pin # 5 of the IC STV 8225 as FM Sound Input in order to be able to select the appropriate (FM or AM) audio signal for producing audio out of the scart connector. The selected signal at pin # 9 of STV8225 drives external audio output connections. On the other hand, the audio switch in STV 8224 is used to select the internal FM signal or the output of STV 8225 (pin # 7), which selects the internal AM signal or External audio signal (at pin # 11) coming from scart socket. The selected audio is processed in volume control stage in according with DC control voltage at pin # 13 and then, it is sent from pin # 14 to sound output stage. The IF signal is filtered at Z102 saw filter which is switchable according to the control signals produced by microcontroller for L or L' mode. Output of SAW is connected to pin # 1 and 14 of SIF IC STV 8225(IC 102) for AM sound producing. The audio switches in STV 8225 selects the signals according to DC voltage at # 10 of STV 8225 .

The IF block produces control signals, which are AGC for tuner at pin # 23 in according to voltage of pin # 24 controlled by microcontroller and AFC for microcontroller at pin # 2.

There are two main switching circuits. First one is the VCO Frequency Switching circuit and the second one is the Saw Filter Switching circuit which covers both Video and Sound saw filters.
The control voltage for VCO switching circuitry is the L/L' signal produced by microcontroller. The logic of this signal, which is defined by MAC-15, is as given in Table 2.1.

Table 2.1 The Logic of the L/L' Switching Voltage (based on MAC-15)

Selected Mode L/L'	Switching Voltage	Adjusted Frequency
Modes other than L'	HIGH	38.9 MHz
L'	LOW	33.9 MHz

This control voltage is applied to R121. When this voltage is LOW, diode D105 is ON and VC101, C129 and C130 are connected in parallel to the reference tank circuit VL101. On the other hand, This circuit is disconnected when L/L' voltage is HIGH since D105 is OFF.

In according to selected system configuration, it must be used multistandard switched type SAW filters. For this reason an optional circuitry is applied this stage by D101, D102, (and if using L/L', D103 ,D104 for SIF SAW Z102).

3. SIGNAL PROCESSING PART :

This part processes video coming from IF part, RGB coming from Scart, Teletext and Controller in order to drive Horizontal and Vertical deflection stages and CRT baseboard and to produce some control voltages by means of Bus-controlled PAL-SECAM-NTSC TV Processor IC, STV 2112/2116/2118 and 64msec Delay Line IC, STV2180. The detailed functional descriptions of these IC's are given in the following subsections.

3.1.5 Other Functions :

Volume Control and Mute output is pin # 10. The voltage range for volume control is 0.5V to 5V, whereas below 0.1V is used for muting. The output of this pin is controlled by microcontroller via bus and the value is saved in related register of the STV 2118.

The selection of the IF standard (Positive or Negative Vision Modulation) and the TV / SCART(AV) mode is controlled by bus. The selection is converting in four voltages which are used to control the IF IC's STV 8224 and STV 8225 on pin # 11. Related voltage levels and their situations are tabulated as follows:

Table 3.1 Related voltage levels and their situations for pin # 11 of STV 2118.

SITUATION		VOLTAGE RANGE (V_{11})	
STANDARD	SOURCE	MIN.	MAX.
NEGATIVE	TV	0	0.7
POSITIVE	TV	2.9	3.8
POSITIVE	SCART	5.2	6.1
NEGATIVE	SCART	7.88	9

3.2 Base Band Chroma Delay Line IC STV 2180 :

The STV 2180 is an integrated base band chroma delay line with one line delay, which has been designed to match chroma decoders with color difference signal outputs (R-Y) and (B-Y). This IC has dual switched capacitors delay line with 3 MHz clock and integrated filters to suppress the residual clock components. It designed to work in conjunction with STV 2112/2116/2118 and it allows an adjustment free application.

The inputs for this IC are as follows :

- (R-Y) at pin # 2 coming from STV 2118
- (B-Y) at pin # 14 coming from STV 2118
- Sandcastle Pulse at pin # 6 coming from STV 2118

On the other hand, outputs of this IC are as follows :

- Delayed (R-Y) at pin # 3
- Delayed (B-Y) at pin # 4

4. HORIZONTAL OUTPUT AND EHT STAGE :

The horizontal pulses, from pin #36 of IC401, are connected to base of driver transistor Q601 through Q601, R603, C601. The driver circuitry (Q601, R604, C602, L602, R608) drives the horizontal deflection output transistor BU808DFI (Q602). TR601 is the EHT (Extra High Tension) transformer. The 112V supply voltage for the stage is connected at # 2. TR601 transformer generates EHT, focus and G2 voltages, required by picture tube. Furthermore, the 200V supply for video output, 26V supply for vertical output and heater drive current are derived from this transformer. The beam current information from pin #8 of TR601 is used for reducing the contrast at excessive long term average beam current and compensation voltage to vertical output to stabilize picture height. The flyback signal sample (AC coupled and clipped by R606, C614, C604, D602, D601) is used to generate sandcastle pulse for video processor IC and horizontal pulse (Q603) required by uC.

5. VERTICAL OUTPUT STAGE (TDA 1771)

The TDA1771 (IC701) vertical deflection integrated circuit is used for output of vertical stage. Trigger pulses from STV2118 feeds to pin # 3 of TDA1771. The signal produced by built in ramp generator synchronizes input trigger pulses. Amplitude is adjusted by an independent input pin (# 4). Built in voltage generator output, feedback information by pin # 8, internal sawtooth signal and amplitude information are applied to output OP-AMP. This output stage has also thermal protection and flyback generator for reliability and effectivity. Applied pulse from STV2118, contains vertical position information as maximum dc level of signal and is extracted by Q701 and fed as a part of feedback to output stage. Vertical shift DC supply is obtained via R716. The amplitude control is supplied by STV2118. Vertical deflection output stage is supplied by +26V output of FBT and D605, C603 circuitry.

6. SOUND OUTPUT STAGE (TDA2822M) :

TDA2822M is used as the AF output amplifier. It is supplied by +12V coming from a separate winding in the SMPS transformer (T802). Pin #14 of the STV8223 (or STV 8224) is AC coupled to the input pin #7 of the TDA2822M via a resistor divider. Maximum audio output power at 10% THD is 1.5W. Q301 for start up muting and Q302 for muting by uC are used, and an alarm signal by uC is fed to this input.

7. POWER SUPPLY (SMPS) :

The DC voltage sources required at various stages of the chassis are provided by an SMPS controlled by the IC801 (MC44603 for common models and MC44604 for 'low power consumption on stand by mode' models). This IC is designed for driving, controlling and protecting the switching MOSFET transistor of SMPS (Q801). This supply has three outputs; one 112V output which is used for horizontal output and 33V generation needed by tuner section, one 16V output for all small signal sections an uC and one for audio output section. This chassis may be used in 90 - 270 volt with appropriate optional circuitry and components. The uC which is supplied by a source designed regulator with zener diode (D814) controls stand by mode by switching Q803 (for 44604 application Q806).

8. uC (MICROCONTROLLER) :

The microcontroller hardware that is member of the ST6 family has a TV receiver control software with menu control. It controls the chassis through IIC bus, PWM outputs and I/O ports. Dominant features of controller are control of optional teletext, outputs for OSD, IR control signal receiving, and internal EEPROM.

The controller has IIC communication port at # 40 , # 41 and OSD driver (R,G,B,FBI) at # 22, # 23, # 24, # 25. PWM control outputs are tuning # 34; vertical linearity adjustment # 1; AGC adjustment # 2. Other control outputs are Muting - video ident # 3; led driver # 4; system switches # 5, # 6, # 8, # 19, # 20, # 36; tuner switches # 18, # 19 and inputs are AFC information from IF # 9; keyboard # 10, # 11, # 13, # 14; scart mode ident (4/3-16-9) # 38, # 39; horizontal sync # 26; vertical # 27; infrared # 35 and reset # 33.

The uC starts system according to option diodes configuration (D501, D503, D505, D506, D508).

The controller has also a software which is able to control some service adjustments: R,G,B gain; R,G cut off; vertical position; vertical linearity; horizontal position; vertical amplitude; AGC; language selection for teletext.

For enter to service mode followed procedure must be act within four seconds:

1- Press volume down button on the keyboard;
2- Press 'prog' button on the R/C hand set;
3- Press '--' button on the R/C hand set;
4- Press "TV " button on the R/C hand set;

Parameters can be sellected by program up and down, parameter adjustments can be done by volume up and down buttons. Memorizing the adjusted parameters can be done by pressing red button. For exit from service mode Press " TV " button.

9. TELETEXT :

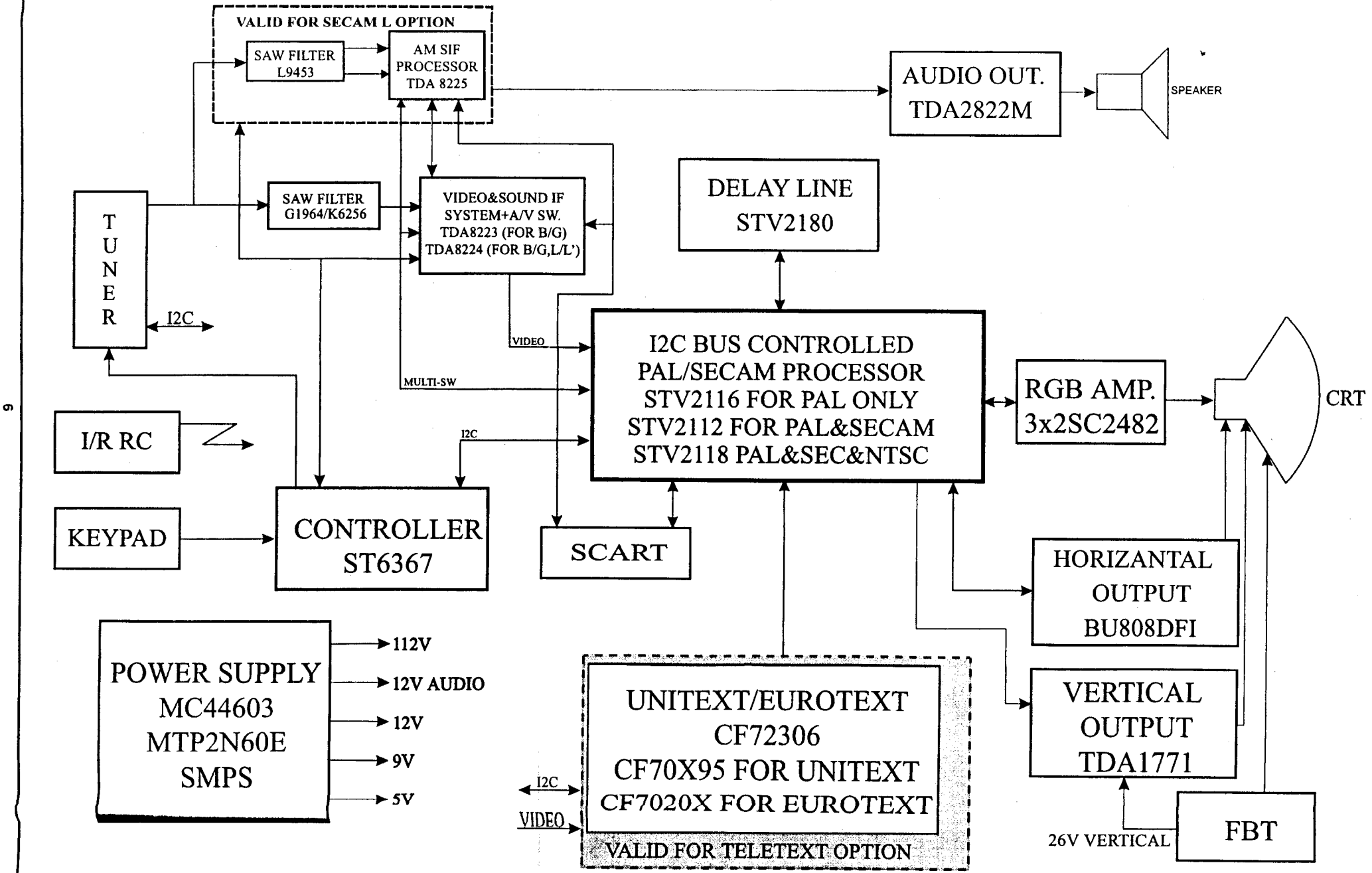
The video signal coming from IF stage is fed to Data Slicer IC001. Then, there are two possibilities for decoding part; CF70095 or CF70195 for 1-Page simple text applications and CF7020X family for fastext and toptext applications. Finally, R, G, B and FBL signals are sent to the related inputs of STV2118.
The alignment procedure for CF70095 or CF70195 application is as following:

1- Apply a video with teletext transmission and select for teletext.
2- Adjust the coil (VL001) for the voltage at pin # 28 2.5V.

10. CRT BASE-BOARD :

When RGB signals enter the input of the video amplifier stage (CRT base-board), they are amplified by means of three symmetrical video amplifier stages. For this purpose three 2SC2482 high voltage, video output transistors are used. So, high gain-bandwidth product is achieved. Furthermore black level changes at the output amplifiers caused by temperature or component agings are compensated by means of a closed loop control system. For this reason the cathode current information (ICAT) is sent to STV2118.

BLOCK DIAGRAM OF THE
CHASSIS : 11AK20



MC44603

Advance Information

Mixed Frequency Mode GreenLine PWM Controller:

Fixed Frequency, Variable Frequency, Standby Mode

GENERAL DISCRIPTION

The MC44603 is an enhanced high performance controller that is specifically designed for off-line and dc-to-dc converter applicitions. This device has the unique ability of automatically changing operating modes if the converter output is overloaded, unloaded, or shorted, offering the designer additional protection for increased system reliability. The MC44603 has several distinguishing features when compared to conventional SMPS controllers. These features consist of a foldback facility for overload protection, a standby mode when the converter output is slightly loaded, a demagnetization detection for reduced switching stresses on transistor and diodes, and a high current totem pole output ideally suited for driving a power MOSFET. It can also be used for driving bipolar transistor in low power converters (<150 W). It is optimized to operate in continuous mode. It's advanced design allows use in current mode or voltage mode control applications.

FEATURES :

Current or Voltage Mode Controller

- Operation up to 250 kHz Output Switching Frequency
- Inherent Feed Forward Compensation
- Latching PWM for Cycle-by-Cycle Current Limiting
- Oscillator with Precise Frequency Control

High Flexibility

- Externally Programmable Reference Current
- Secondary or Primary Sensing
- Synchronization Facility
- High Current Totem Pole Output
- Undervoltage Lockout with Hysteresis

Safety/Protection Features

- Overvoltage Protection Against Open Current and Open Voltage Loop
- Protection Against Short Circuit on Oscillator Pin
- Fully Programmable Foldback
- Soft-Start Feature
- Accurate Maximum Duty Cycle Setting
- Demagnetization (Zero Currrent Detection) Protection
- Internally Trimmed Reference

GreenLine Controller: Low Power Consumption in Standby Mode

- Low Startup and Operating Current
- Fully Programmable Standby Mode
- Controlled Frequency Reduction in Standby Mode
- Low dV/dT for Low EMI Radiations.

PINNING

1- VCC	This pin is the positive supply of the IC. The operating voltage range after startup is 9.0 to 14.5V.
2- VC	The output high state (V_{OH}) is set by the voltage applied to this pin. With a separate connection to the power source, it can reduce the efffects of switching noise on the control circuitry.
3- OUTPUT	Peak currents up to 750mA can be sourced or sunk, suitable for driving either MOSFET or Bipolar transistör. This output pin must be shunted by a Schottky diode, 1N5819 or equivalent.
4- GND	The ground pin is a single return, typically connected back to the power source;it is usedas control and power ground.
5- Foldback Input	The foldback function provides overload protection. Feeding the foldback input with aportion of the VCC voltage (1.0V max) establishes on the system control loop a foldback characteristic allowing a smoother startup and sharper overload protection. Above 1.0V foldback input is inactive.
6- Overvoltage Protection	When the overvoltage protection pin receives a voltage greater than 17V, the device is disabled and requires a complete restart sequence. The overvoltage level is programmable.
7- Current Sense Input	A voltage proportional to the current flowing in to the power switch is connected to this input. The PWM latch uses this information to terminate the conduction of the output buffer when working in a current mode of operation. A maximum level of 1.0V allows either current or voltage mode of operation.
8- Demagnetization Detection	A voltage delivered by an auxiliary transformer winding provides to the demagnetization pin an indication of the magnetization state of the flyback transformer. A zero voltage detection corresponds to complete core saturation. The demagnetization detection ensures a discontinuous mode of opertion. This function can be inhibited by connecting Pin 8 to Gnd.
9- Synchronization Input	The synchronization input pin can be activated with either a negative pulse going from a level between 0.7V and 3.7V to Gnd or a positive pulse going from a level between 0.7 and 3.7V up to a level higher than 3.7V. The oscillator runs free when Pin 9 is connected to Gnd.
10- CT	The normal mode oscillator frequency is programmed by the capacitor CT choice together with the Rref resistance value. CT, connected between Pin 10 and Gnd, generates the oscillator sawtooth.
11- Soft-Start/Dmax /Voltage-Mode	A capacitor, resistor or a voltage source connected to this pin limits The switching duty-cycle. This pin can be used as a voltage mode control input. By connecting Pin11 to Ground, the MC44603 can be shut down.
12- RP Standby	A voltage level applied to the RP Standby pin determines the output power level at which the oscillator will turn into the reduced frequency mode of operation (i.e. standby mode). An internal hysteresis comparator allows to return in the normal mode at a higher output power level.
13- E/A Out	The error amplifier output is made avaliable for loop compensation.
14- Voltage Feedback	This is the inverting input of the Error Amplifier. It can be connected to the switching power supply output through an optical (or other) feedback loop.
15- RF Standby	The reduced frequency or standby frequency programming is made by the RF Standby resistance choice.
16-R_{ref}	R_{ref} sets the internal reference current. The internal reference current ranges from 100µA to 500 µA. This requires that 5.0kΩ ≤ R_{ref} ≤ 25 kΩ.

MC-Service

ST 6385

8 BIT HCMOS MCUs FOR TV VOLTAGE SYNTHESIS WITH OSD

GENERAL DESCIRIPTION

The ST6385,86,87,88 microcontrollers are member of the 8-bit HCMOS ST638X family, a series of devices specially oriented to TV applications. Different pin-out and peripheral configyration are avaiable to give the maximum aplication and cost flexibility. All ST638X members are based on a building block appoach: a common coreis surrounded by a combination of on-chip peripherals (macrocells) avaiable from a standard library. These peribherals are designed with the same Core technology providing full compatibility and short desing time. Many of these macrocells are specially dedicated to TV applications. The macrocells of the ST638X family are : two Timer peripherals each including an 8-bit counter with a 7 bit software programmable precaler (Timer), a digital hardware activated watchdog function (DHWD), a 14-bit voltage synthesis tuning pripheral, a serial peripheral interface (SPI), up to six 6-bit PWM D/A converters, an AFC A/D converter with 0.5V resolution, an on-screen display (OSD) with 15 characters per line, 128 characters (in two banks each of 64 chracaters). In addition the following memory resources are available: program ROM (20K), data RAM (256 bytes),
EEPROM (384 bytes). Refer to pin configurations figures and to ST638X device summary (Table 1) for the definition of ST638X family members and a summary of differences among the different types.

FEATURES

- 8-bit Architecture
- HCMOS Technology
- 8Mhz Clock
- User Program ROM: 20140 bytes
- Reserved Test ROM: 336 bytes
- Data ROM: User selectable size
- Data RAM: 256 bytes
- Data EEPROM: 384 bytes
- 42-Pin Shrink Dual in Line Plastic Package
- Up to 22 software programmable general purpose Inputs/Outputs,including 2 direct LED driving nOutputs
- Two Timers each including an 8-bit counter with a 7-bit programable prescaler
- Digital Watchdog Fuction
- Serial Peripheral Interface (SP) supporting S-BUS/ I²C BUS and standart serial protocols
- Up to Six 6-Bit PWM D/A Converters
- 62.5KHz Output Pin (ST6386,88 Only)
- AFC A/D converter with 0.5V resolution
- Five interrupt vectors (IRIN/NMI, Timer 1 & 2, VSYNC, PWR INT.)
- 14 bit counter for voltage synthesis tuning
- On-chip clock oscillator
- 5 Lines by 15 Characters On-Screen Diplay Generator with 128 Characters
- Byte efficient instruction set
- Bit test and jump instructions
- Wait and Bit Manipulation insructions
- True LIFO 6-level stack
- All ROM types are supported by pin-to-pin piggy-back versions.
- The develeopment tool of the ST638X microcon-trollers consists of the ST638X-EMU emulation and development system to be connected via a standard RS232 serial line to an MS-DOS Personal Computer.

PINNING

1- **DA0**	Output, Open-Drain, 12V
2- **DA1**	Output, Open-Drain, 12V
3- **DA2**	Output, Open-Drain, 12V
4- **DA3**	Output, Open-Drain, 12V
5- **DA4**	Output, Open-Drain, 12V
6- **DA5**	Output, Open-Drain, 12V
7- **62.5KHz OUT**	Output, Open-Drain, 12V
8- **AFC**	Input, High Impedance, 12V
9- **VS**	Output, Push-Pull
10- **R,G,B, BLANK**	Output, Push-Pull
11- **HSYNC, VSYNC**	Input, Pull-up, Schmitt Trigger
12- **OSDOSCIN**	Input , High Impedance
13- **OSDOSCOUT**	Output, Push-Pull
14- **TEST**	Input Pull-Down
15- **OSCIN**	Input, Resistive Bias, Schmitt Trigger to Reset Logic Only
16- **OSCOUT**	Output, Push-Pull
17- **RESET**	Input, Pull-up, Schmitt Trigger Input
18- **PA0**	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input

19- PA1	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
20- PA2	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
21- PA3	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
22- PA4	I/O, Open Drain, 12V, No Input Pull-up, Schmitt Trigger Input
23- PA5	I/O, Open Drain, 12V, No Input Pull-up, Schmitt Trigger Input
24- PA6	I/O, Open Drain, 12V, No Input Pull-up, Schmitt Trigger Input, High Drive
25- PA7	I/O, Open Drain, 12V, No Input Pull-up, Schmitt Trigger Input, High Drive
26- PB0	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
27- PB1	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
28- PB2	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
29- PB3	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
30- PB4	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
31- PB5	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
32- PB6	I/O, Push-Pull, Software Input Pull-up, Schmitt Trigger Input
33- PC0	I/O, Open Drain, 5V , Software Input Pull-up, Schmitt Trigger Input
34- PC1	I/O, Open Drain, 5V , Software Input Pull-up, Schmitt Trigger Input
35- PC2	I/O, Open Drain, 5V , Software Input Pull-up, Schmitt Trigger Input
36- PC3	I/O, Open Drain, 5V , Software Input Pull-up, Schmitt Trigger Input
37- PC4	I/O, Open Drain, 12V , No Input Pull-up, Schmitt Trigger Input
38- PC5	I/O, Open Drain, 12V , No Input Pull-up, Schmitt Trigger Input
39- PC6	I/O, Open Drain, 12V , No Input Pull-up, Schmitt Trigger Input
40- PC7	I/O, Open Drain, 12V , No Input Pull-up, Schmitt Trigger Input
41- PC8	I/O, Open Drain, 12V , No Input Pull-up, Schmitt Trigger Input
42- V_{DD}, V_{SS}	Power Supply Pins

STV8224B

MULTISTANDARD VIDEO AND SOUND IF SYSTEM WITH AUDIO AND VIDEO SWITCHES

GENERAL DESCRIPTION

The STV8224B is a picture and sound IF processor for multistandart application with very few external components and adjusments.
It provides the audio and video switches for one SCART plug application.
AM sound demodulation is perfomed with the STV8225 add-on.

FEATURES :

- Video PLL Demodulation
- Sound PLL Demodulation
- Positive and Negative Modulation
- AGC for BG and L Standards
- Audio Switch
- DC Volume Control
- Video Switch

PINNING

1- Pif PLL Filter
2- AFC Output
3- CVBS Output
4- Switching Input (Standard+INT/EXT)
5- IF LC
6- IF LC
7- Audio High Pass Filter
8- 2nd IF Sound Input
9- Audio and 'nd IF Decoupling
10- Internal Video Input
11- Video Switch Output
12- External Video Input
13- Volume Control+mute
14- Audio Switch Output
15- FM Demodulated Audio Output
16- External Audio Input
17- V_{CC}
18- Grount
19- IF Input
20- IF Input
21- ACG Capacitor (L Standard)
22- ACG Capacitor
23- Tuner AGC Output
24- Tuner AGC starting point Adjustment

CF72416
TELETEXT

GENERAL DESCRIPTION

The CF72416 is a new device comparable with the currently available CF72306 but having the added capability of extracting 'Video Programming System' (VPS) data. The CF72416 forms the Analogue component of the texas Instruments (TI) teletext system.

The device performans the functions of composite sync separation and both teletext and VPS data extraction and clock regeneration from the recevied video signal and passes clock, data and composite sync to the digital decoder chip. The same pins are used for either teletext or VPS data and are identified by the appropriate decoder.

The CF72416 device has the following features and enhancements over the CF72306:-

(a) VPS data decoding.

(b) Improved adaptive slicing level for the Sync seperator and sync noise information added to composite sync which when used with Texas Instruments' Multipage and Eurotext decoders gives improved locking performance.

(c) Minor board changes are required to upgrade to the CF72416 from the CF72306.

The crystal oscillator is the same as used with the CF72306. The crystal specification is given below:-

13.875MHZ Crystal Specification

- Oscillation Mode ..... Fundamental Parallel
- Frequency ..... 13.8750 MHz
- Crystal Frequency Stability ..... ± 150ppm *
- Maximum Crystal ESR (steady-state) ..... 60 Ohms
- Maximum Crystal ESR (start-up) ..... 120 Ohms
- Maximum Shunt Capacitance ..... 7 pF
- Maximum Motional Capacitance ..... 30 fF
- Crystal Load Capacitance ..... 18 pF
- Free Air Operating Temperature Range ..... 0 to 70 ° C
- Drive Level ..... 1 mW max.
- Ageing ..... ± 5 ppm max for first year

* Includes temperature stability and manufacturing tolerance.

FEATURES

- Extracts both Teletext and VPS data
- Forms a custom 2-chip solution when used with an ASICTEXT decoder
- Low power 1µm CMOS (<100mW)
- Standard 20 pin/300mll package.
- Tolerates a range of video distortions
- Operates with 13.875 MHz fundamental mode crystal.

PINNING

1-	**TSIG**	Video Sync Reference
2-	**SSIG**	Video Sync Input
3-	**SSIG**	Video Data Input
4-	**AGND1**	Analogue Ground
5-	**OSC1**	13.875 MHz Oscilator
6-	**OSC2**	13.875 MHz Oscilator
7-	**AVCC**	Analogue Vcc
8-	**CREF**	Video Data Reference Input
9-	**AGND2**	Analogue Ground
10-	**BIAS**	Internal Reference
11-	**TSTAPLB**	Test/Application
12-	**TCLK**	Teletext Clock
13-	**TDATA**	Teletext Data
14-	**DGND2**	Digital Ground
15-	**OSCOUT**	Oscillator Output
16-	**DVCC**	Digital Vcc
17-	**WIND**	Timing Signal
18-	**DGND1**	Digital Ground
19-	**SYNC**	Separated Sync Output
21-	**TEXTSEL**	Sync Noise Select Note 1

Signal pins = 14 Power pins = 6

STV 2118B

BUS CONTROLLED PAL/SECAM/NTSC TV PROCESSOR

GENERAL DESCIRIPTION

The STV2118B is fully bus controller IC for TV luma, chroma and deflection processing.
Used with STV8224 (PIF/SIF/swicthes), TDA 1771 or TDA8174 (frame booster), STV2180(delay line), it allows to desing a PAL/SECAM/NTSC (BGDKILMN) set with very few external components and no adjustment.

FEATURES :

- I²C Bus Control Of All Functions
- Integrated Filters (Trap,Badpass,Cloche)
- Integrated Luminance Delay Line
- PAL/SECAM/NTSC Chroma Demodulators
- Automatic Cut-Off Current Loop
- Two PLLs Horizontal Deflection
- Vertical Cont down
- Very Few External Components

PINNING

1-	**GND2**	Chroma/Scanning Ground
2-	**CXTL2**	3.58 MHz XTAL
3-	**CXTL1**	4.43 MHz XTAL
4-	**CLPF**	Chroma Loop Filter
5-	**ACC**	Acc Control Capacitor
6-	**SDA**	Data Wire I²C Bus
7-	**SCL**	Clock Wire I²C Bus
8-	**FTUN1**	Filter Tuning
9-	**FTUN2**	Cloche Filter Tuning
10-	**VOL**	Volume and Mute Control Voltage
11-	**SWI**	If Standart and switch selection
12-	**BOS D**	Os d Blue Input
13-	**GOS D**	Os d Green Input
14-	**ROS D**	Os d Red Input
15-	**FBOS D**	Os d RGB Insertion
16-	**BEXT**	External Blue Input
17-	**GEXT**	External Green Input
18-	**REXT**	External Red Input
19-	**FBEXT**	Extrenal RGB Insertion
20-	**Y/CVBS**	CVBS or Luminance Input
21-	**GND1**	Bus/Video Ground
22-	**V_{CC1}**	Video Supply
23-	**CHR/S VHS**	Crominance INPUT/SVHS Selection
24-	**CG**	Green Cut-Off Capacitor
25-	**CB**	Blue Cut-Off Capacitor
26-	**CR**	Red Cut-Off Capacitor
27-	**BO**	Blue Output
28-	**GO**	Green Output
29-	**RO**	Red Output
30-	**ICAT**	Cathode Current Measurement
31-	**BCL**	Beam Current Limiter
32-	**SXTL**	503 kHz Ceramic
33-	**SLPF**	CScanning Loop Filter
34-	**VAMP**	Amplitude Control Voltage
35-	**VOUT**	Vertical Output
36-	**HOUT**	Horizontal Output
37-	**LFB/SC**	Line Flyback INPUT/SANDCASTLE Output
38-	**BYI**	B-Y Input
39-	**RYI**	R-Y Input
40-	**RYO**	R-Y Output
41-	**BYO**	B-Y Output
42-	**V_{CC2}**	Chroma/Scanning/Bus Supply

M3004LAB1
REMOTE CONTROL TRASMITTER

GENERAL DESCRIPTION

The M3004LAB1/M3004LD transmitter IC are designed for infarared remote control systems. It has a total of 448 commandswhich are divided into 7 sub-system groups with 64 commands each. The sub-system groupswith 64 commands each. The su-system code my be selected by a press button, a slider switch or hard wired .

The M3004LAB1/M3004LD generate the pattern for driving the output stage. These patterns are pulse distance coded. The pulses are infared flashes or modulated. The transmission mode is defined in conjuction with the sub-system adress.Modulated pulses allow receivers with narrow-band preamplifiers for improved noise rejection to be used. Flashed pulses require a wide-band preamplifier within the receiver.

FEATURES :

- Flashed or modulated Transmission
- 7 Sub-System Address
- High-Current Remote Output at V_{DD} = 6V ($-I_{OH}$ = 80 mA)
- Low Number Additional Components
- Key Release Detection by toggle bits
- Very Low Stand-by Current (<2µA)
- Operational Current < 1mA at 6V Supply
- Supply Voltage Range 2 to 6.5V
- Ceramic Resanator Controlled Frequency (typ. 450kHz)

PINNING

1-	Remo	11-	V_{DD}
2-	SEN 6N	12-	DRV 6N
3-	SEN 5N	13-	DRV 6N
4-	SEN 4N	14-	DRV 6N
5-	SEN 3N	15-	DRV 6N
6-	SEN 2N	16-	DRV 6N
7-	SEN 1N	17-	DRV 6N
8-	SEN 0N	18-	DRV 6N
9-	ADRM	19-	OSC OUT
10-	V_{SS}	20-	OSC IN

TDA1771
VERTICAL DEFLECTION CIRCUIT

GENERAL DESCRIPTION

The TDA1771 is a monolithic integrated circuit in SIP10 package It is a full performance and very efficient vertical deflection circuit intended for direct of a TV picture tube in Color and B & W television as well as in Monitor and Data displays.

FEATURES

- Ramp Generator
- Independent Amplitude Adjutement
- Buffer Stage
- Power Amplifier
- Flyback Generator
- Internal Reference Voltage
- Thermal Protection

PINNING

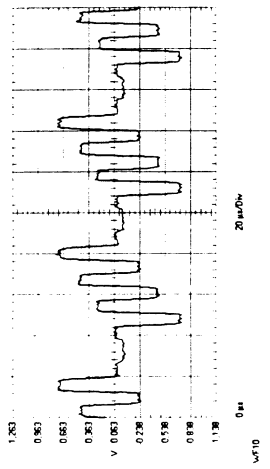
1. Flyback Generator
2. V_s
3. Inverting Input
4. Buffer Output
5. Ramp Generator
6. Ground
7. Height Adjustment
8. Trigger Input
9. Output Stage V_s
10. Power Output

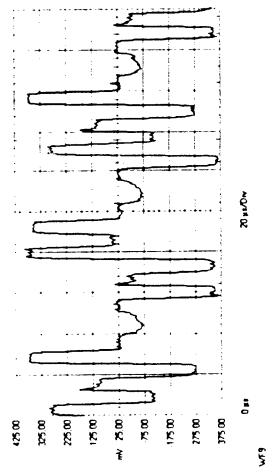
ELECTRONIC COMPONENT PART LIST

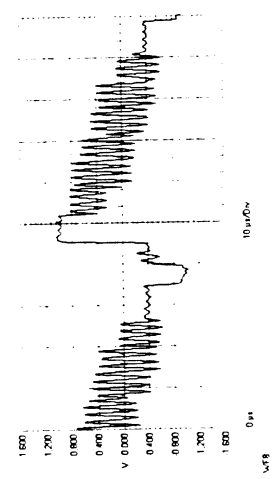
POZ. NO	VESKOD	DESCRIPTION
	1006000000	ANTENNA ROD (W/ADAPTOR)
Q602	3611608081	TR BU808DFI
C801	3011041558	CAP MKT 100NF 250V M AC
C802	3011041558	CAP MKT 100NF 250V M AC
C803	3011041558	CAP MKT 100NF 250V M AC
C609	3032243058	CAP MKP 220NF 250V M
C709	3081020554	CAP EL 1000UF 35V M
C819	3202227458	CAP CER 2.2NF 4KV M
J801	3363380437	RES FUSE 1/4W 0.33R J
R718	3364791137	RES FUSE 1W 4.7R J
R801	3382295130	RES WW 5W 2.2R J RAD.
TH801	3391803000	THERM.PTC DEGAUSS DUAL 250V
D811	3550827200	DIODE BYV27-200
D809	3551500261	DIODE BYM26D
Q601	3611606790	TR BD679A
IC301	3621628220	IC TDA2822M
SW501	4390415000	SWITCH TACT
SW503	4390415000	SWITCH TACT
SW504	4390415000	SWITCH TACT
Z101	3750219630	FILTER SAW G1963
Z103	3760105500	FILTER SER 5.5MHZ SFE 5.5MB
Z107	3780105500	FILTER SER TRAP TPS 5.5MHZ
	3807250050	FUSE 2.5A 250V 5*20MM
IC806	3621678050	IC L7805CV SGS
IC804	3650003170	IC LM317T
R821	3374750237	RES MG 1/2W 4.7M J
D403	3531941480	DIODE 1N4148
D513	3531941480	DIODE 1N4148
D514	3531941480	DIODE 1N4148
D515	3531941480	DIODE 1N4148
D516	3531941480	DIODE 1N4148
D601	3531941480	DIODE 1N4148
D602	3531941480	DIODE 1N4148
D606	3531941480	DIODE 1N4148
D901	3531941480	DIODE 1N4148
D902	3531941480	DIODE 1N4148
D603	3551900330	DIODE BYD33J
D605	3551900330	DIODE BYD33J
D604	3551901570	DIODE BA157
D806	3551901590	DIODE BA159
D808	3551901590	DIODE BA159
D814	3571905100	DIODE ZENER 5.1V ZPD
D810	3571933000	DIODE ZENER 33V UZT 33B
C804	3201021156	CAP CER 1NF 1KV M B
C805	3201021156	CAP CER 1NF 1KV M B
C806	3201021156	CAP CER 1NF 1KV M B
C807	3201021156	CAP CER 1NF 1KV M B
C914	3201021156	CAP CER 1NF 1KV M B
C614	3204094846	CAP CER 4PF 2KV K SL
Q903	3611504210	TR BF421
Q905	3611504210	TR BF421
Q907	3611504210	TR BF421
D201	3531941480	DIODE 1N4148
D202	3531941480	DIODE 1N4148
D203	3531941480	DIODE 1N4148
D501	3531941480	DIODE 1N4148
D505	3531941480	DIODE 1N4148
D506	3531941480	DIODE 1N4148
Q505	3611502400	TR BF240
D006	3531941480	DIODE 1N4148
D805	3531941480	DIODE 1N4148
D508	3531941480	DIODE 1N4148
C606	3034341538	CAP MKP 430NF 250V J
C603	3036827078	CAP MKP 6.8NF 1.6KV 3.5%
	4941412400	POWER CORD 2.4MT 220V VDE
	1007093003	R/C 930 VESTEL (S)
	3971600304	SPEAKER 16R 3W STAR
IC701	3621617710	IC TDA1771
C604	3011041548	CAP MKT 100NF 250V K DL
C809	3034735038	CAP MKP 47NF 630V J
C607	3083301354	CAP EL 33UF 160V M
C821	3084701358	CAP EL 47UF 160V M (HR)
R829	3361001137	RES FUSE 10R 1W J
IC402	3621621800	IC STV2180

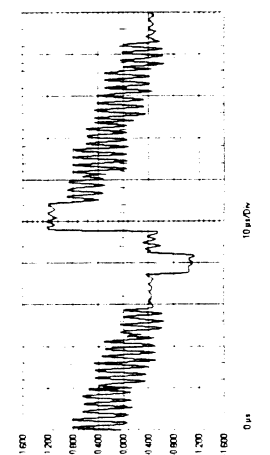
MC-Service

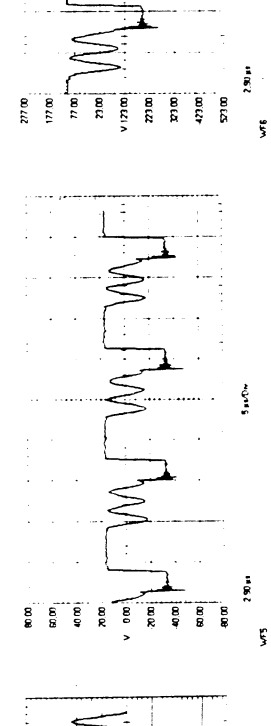
POZ. NO	VESKOD	DESCRIPTION
IR501	3660138000	PREAMPLIFIER TFMS1380
X401	3760105030	FILTER SER 503KHZ
X501	3840380010	XTAL 8MHZ
L802	4013150017	COIL CHOKE 150UH 0.82A RAD
TR601	4030001908	TRF FBT 90ø (AK20)
TR801	4060001100	LINE FILTER 2*27MH
L601	4090109000	LINEARITY COIL 50UH (06-06A)
SW801	4390122000	SWITCH ON/OFF PANASONIC
IC101	3621682230	IC STV8223
TU201	3924224314	TUNER WSP (VST)
VL101	4020008000	ADJ COIL VIF 38.9 Q80
IC002	3620670204	IC CF70204
IC001	3623172416	IC CF72416
X001	3840113920	XTAL 13.875
IC501	3621663870	IC ST6387 VES/M15-01
X402	3840144311	XTAL 4.433619 MHZ (AK15)
Q801	3610002600	TR MTA-2N60E
IC805	3620078090	IC AN7809
IC801	3620246030	IC MC44603
TR802	4042003900	TRF SMPS AK20 90' (170-270V)
R606	3372240237	RES MG 1/2W 220K J
D801	3551940070	DIODE 1N4007
D802	3551940070	DIODE 1N4007
D803	3551940070	DIODE 1N4007
D804	3551940070	DIODE 1N4007
L603	4262220027	CHOKE PEAKING COIL 22UH K
Q902	3612024820	TR 2SC2482
Q904	3612024820	TR 2SC2482
Q906	3612024820	TR 2SC2482
R925	3361590237	RES FUSE 1/2W 1.5R J
	4071409013	DEGAUSS COIL&EART CABLE (14)
	5515030001	CABLE HOLDER CRT (I)
	4941412410	POWER CORD ASSY.(2.4MT W/VDE)
	5105135005	SPRING ON/OFF SWITCH
	5501045086	BUTTON ON/OFF 3745 GRAY (S)
	5501045088	BUTTON FUNCTION 3745 (I)
	5513040001	LENS PRE-AMP 8*28.5MM (I)
	5507000139	FRONT 3745 W/H WO/J AKAI (P)
	5509195200	SNOW BOX ASSY.3745/55
	5509195201	SNOW BOX-TOP 3745/55
	5509195202	SNOW BOX-BOTTOM 3745/55











PL903
CRT-SOCKET
EHT
FOCUS
SCREEN
FLASHY
PL906
F2
FLASHY-CABLE
PL902
(LF 22)
(LF 23)
(LF 24)
PL901
RGB-CABLE
IC001
CF72306
IC002
CF70200
TESTS
SYNC
VIDEO
DUCC
RSTB
CLKIN
DGND
TEST1
TEST4
TDATA
TCLK
CSB
MUTE
TEST3
TEST2
MIND
FLAB2
FLAB1
REF
RESET
RGND
RED
GREEN
RUCC
BLUE
BLANK
SDA
SCL
IC701
TDA1771
IC402
STV2180
IC401
STV2112B
IRA501
TFMS1380
SCART-1
SC401
PL201
FRONT-AUDIO
PL202
FRONT-VIDEO
PL301
SPEAKER
(LF 1)
(LF 2)
(LF 3)
(LF 4)
(LF 5)
(LF 6)
(LF 7)
(LF 8)
(LF 9)
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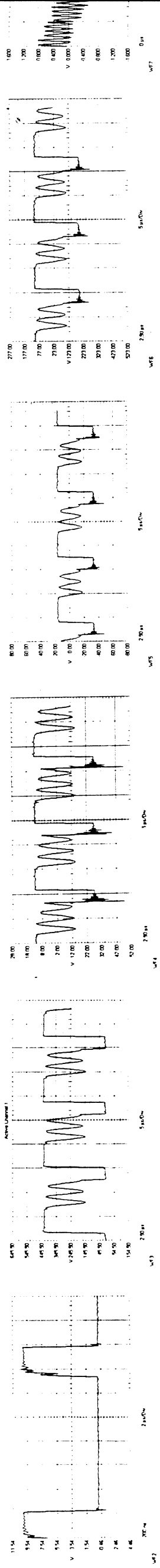
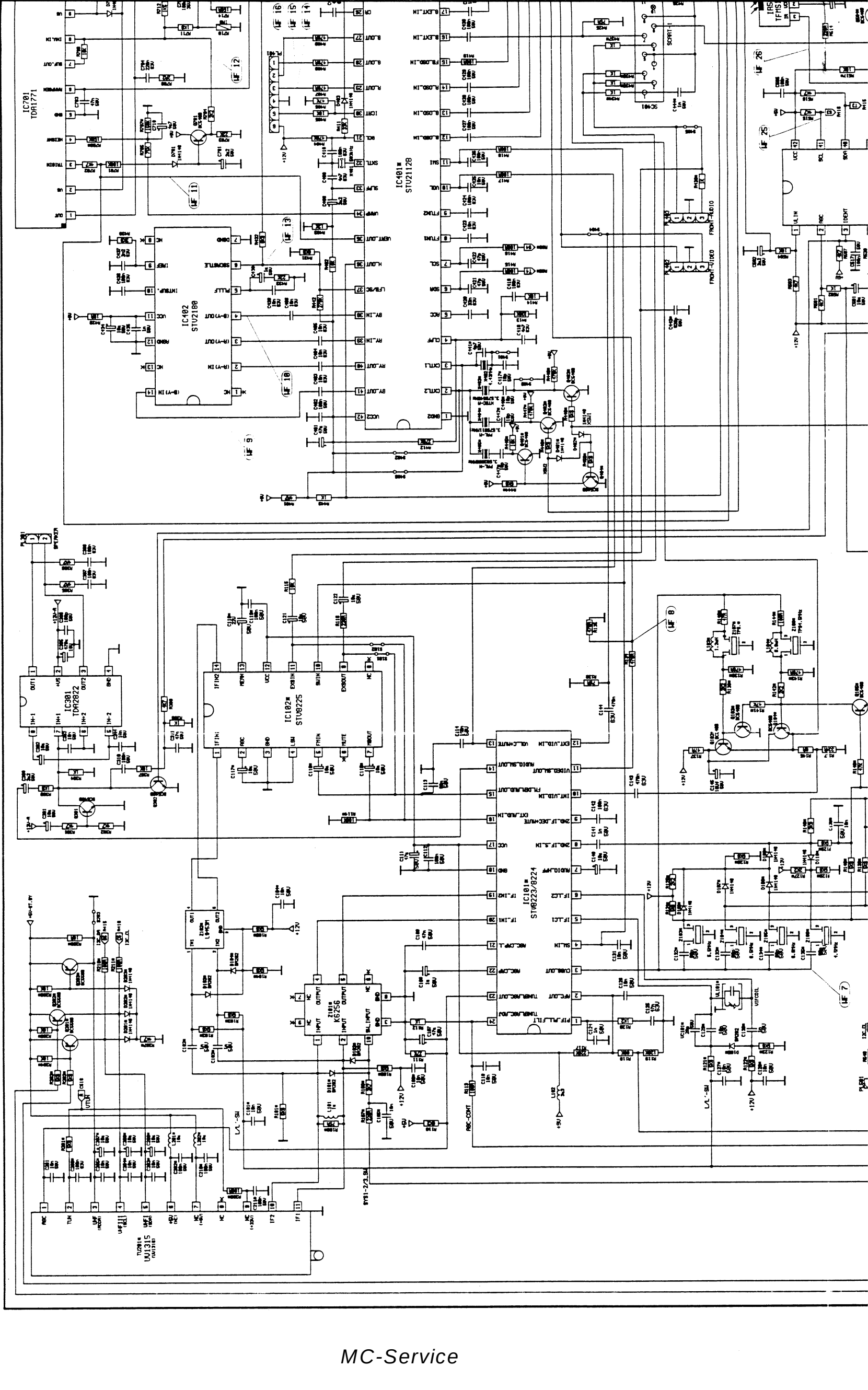
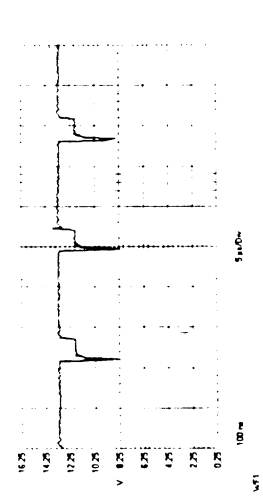
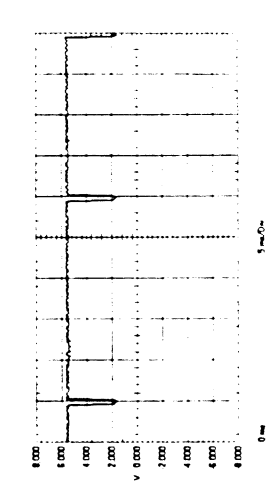
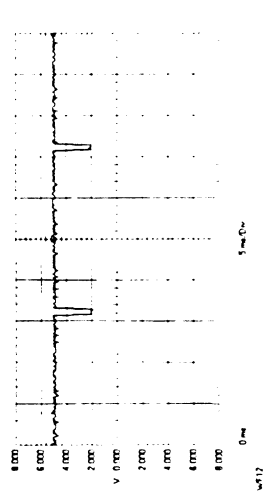


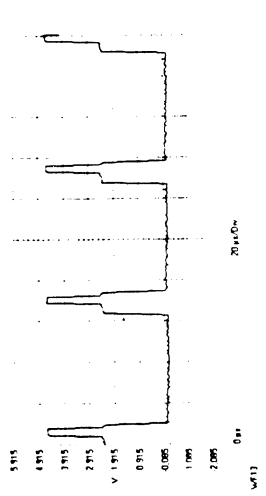


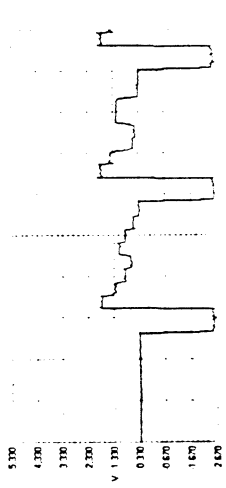
MC-Service







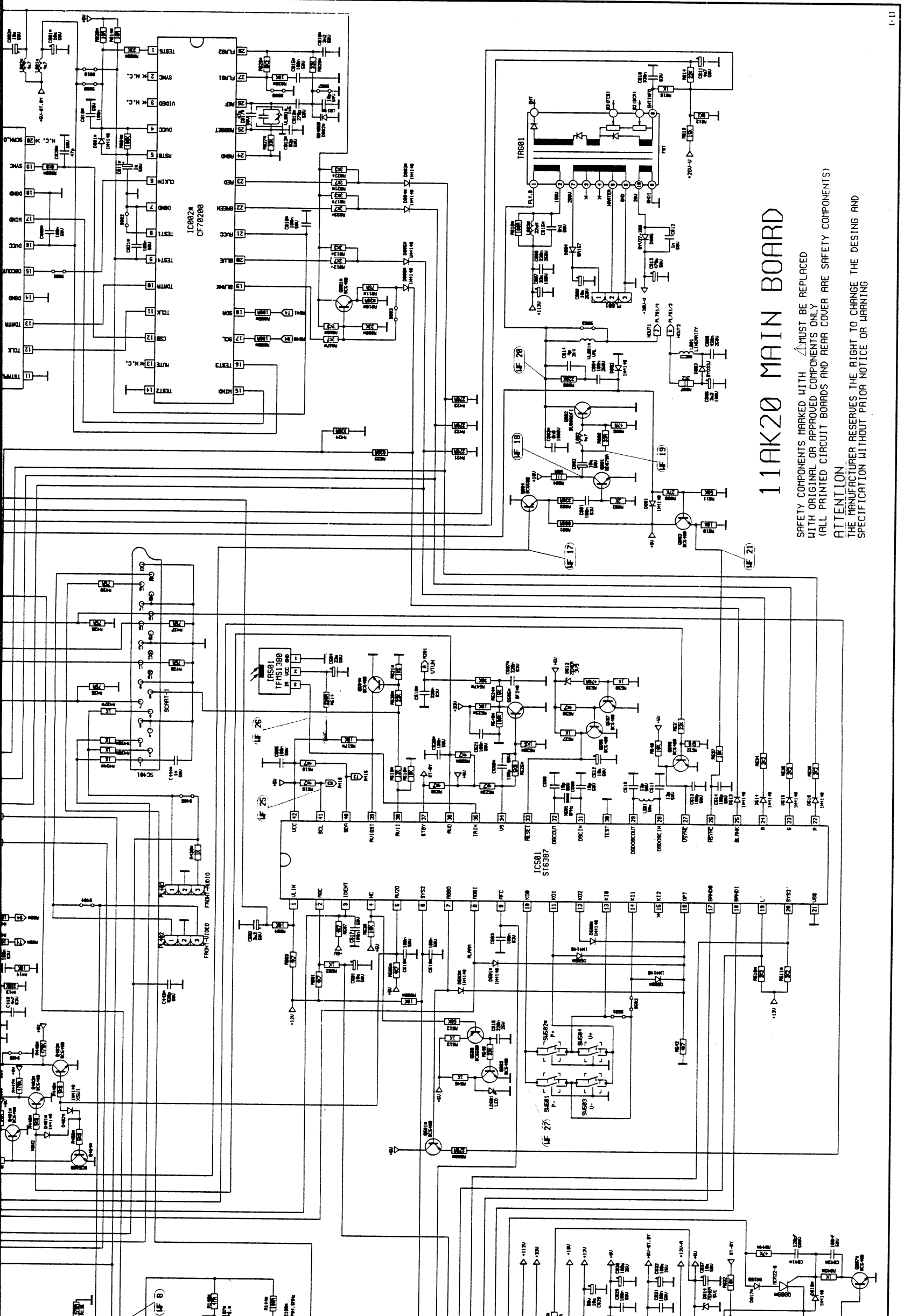


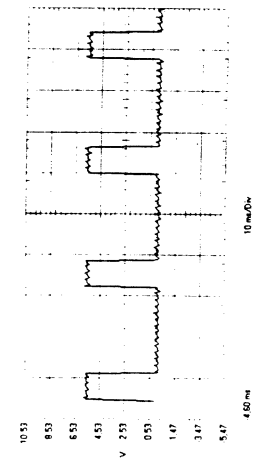


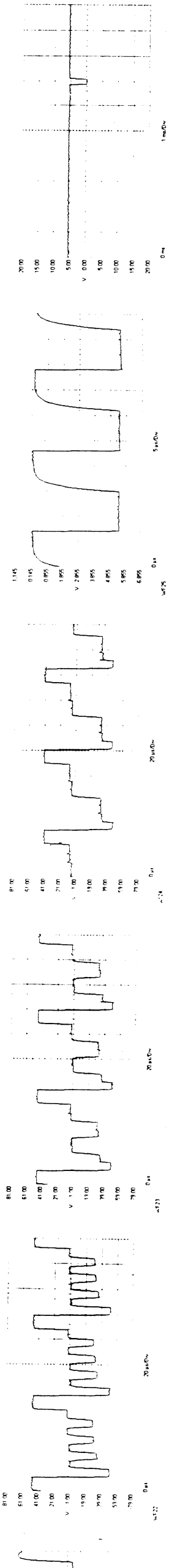
11AK20 MAIN BOARD

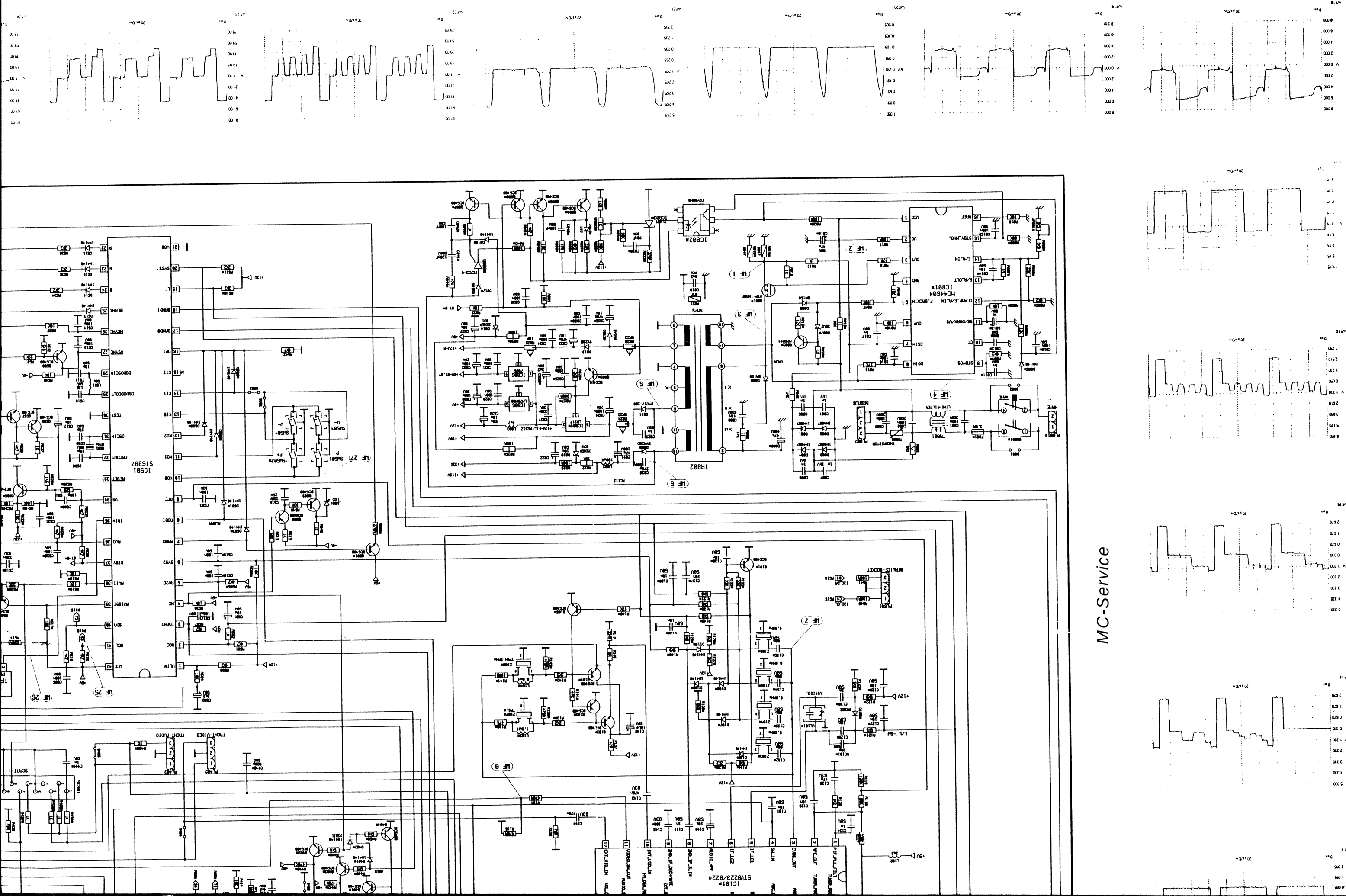
SAFETY COMPONENTS MARKED WITH ⚠ MUST BE REPLACED
WITH ORIGINAL OR APPROVED COMPONENTS ONLY
(ALL PRINTED CIRCUIT BOARDS AND REAR COVER ARE SAFETY COMPONENTS)

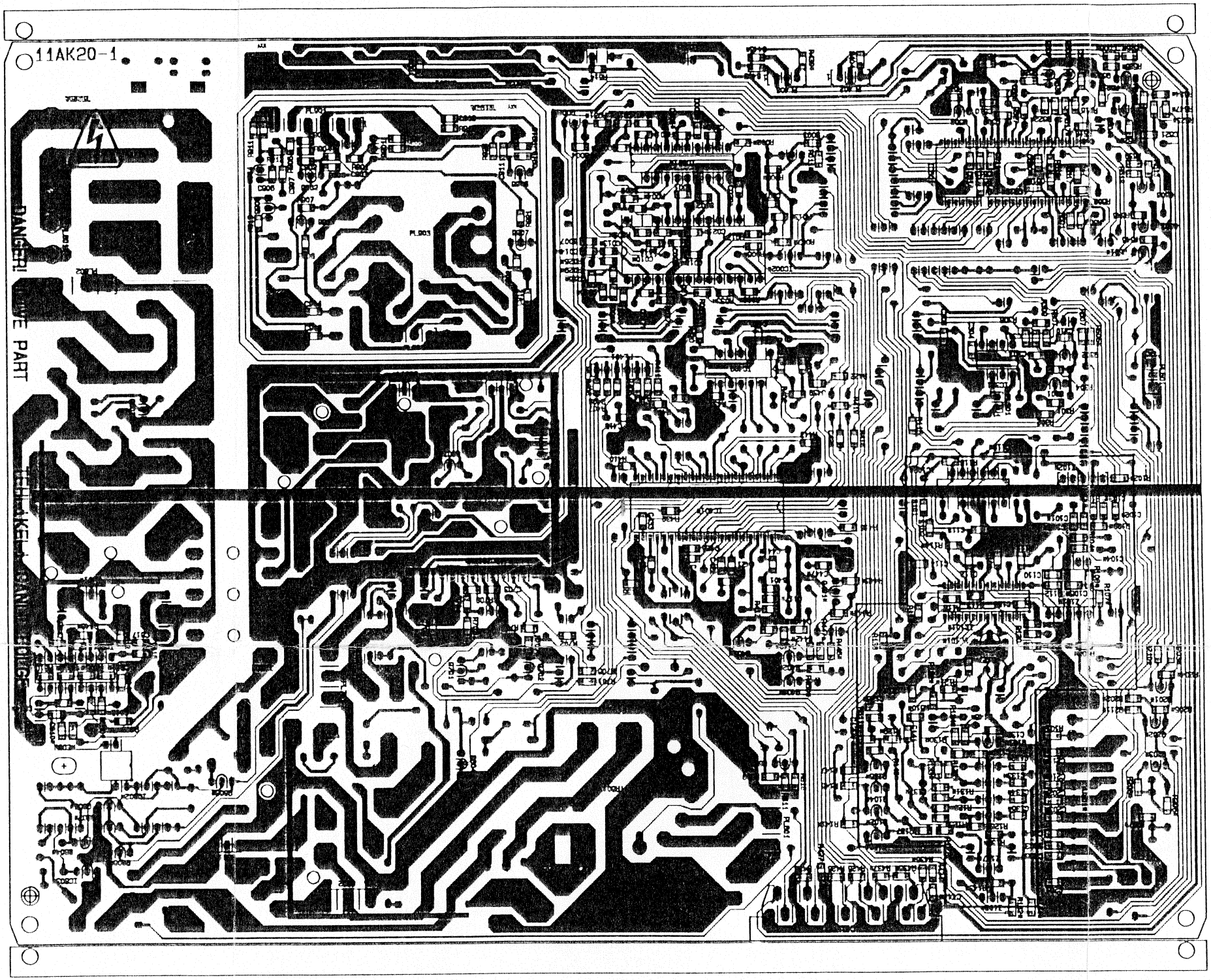
ATTENTION
THE MANUFACTURER RESERVES THE RIGHT TO CHANGE THE DESING AND SPECIFICATION WITHOUT PRIOR NOTICE OR WARNING



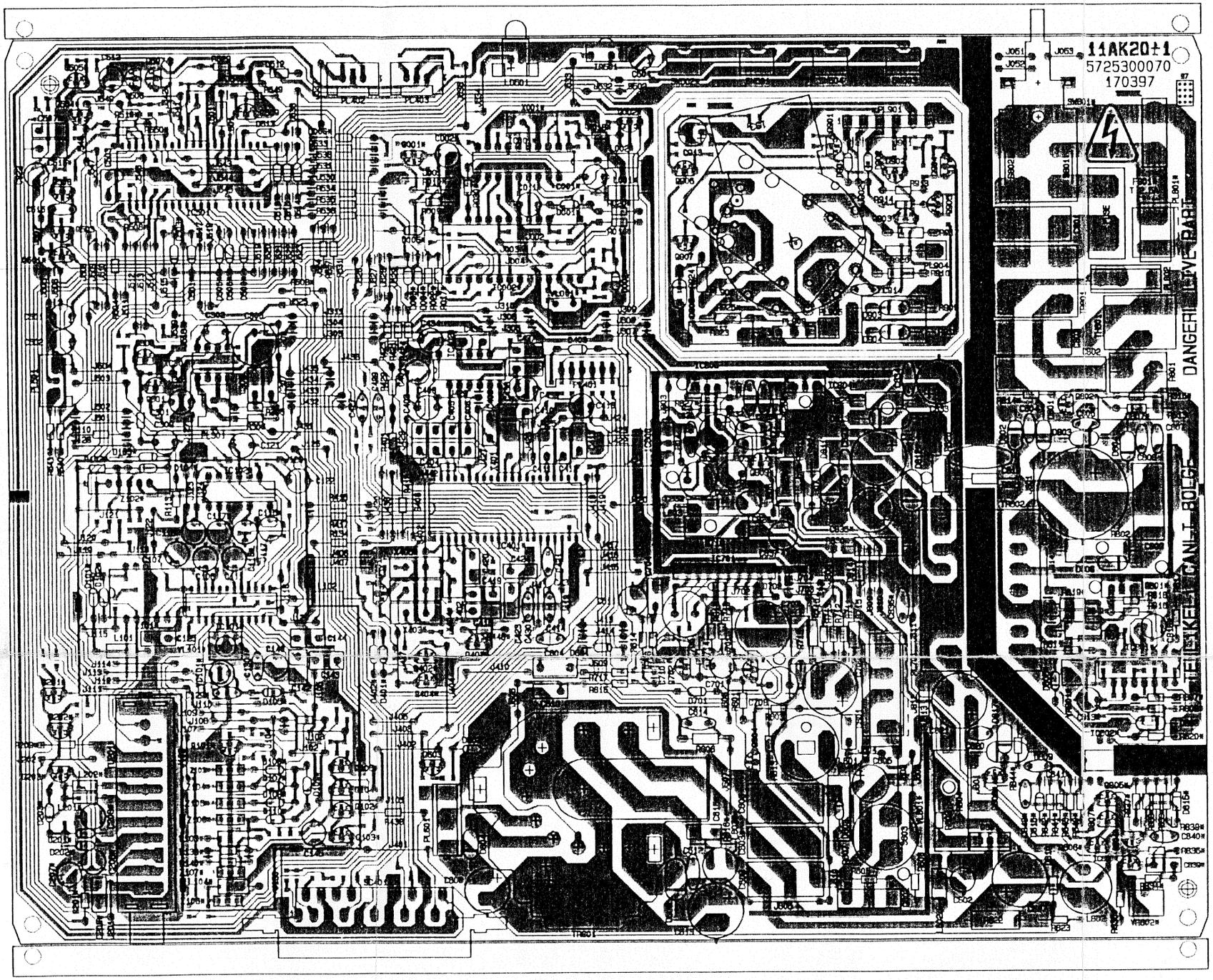








11AK20-1 MAIN PCB (SMD SIDE)



11AK20-1 MAIN PCB